Interferometric Mapping of the Velocity of the Antarctic Ice Sheet Using ERS Tandem Phase Data

Ron Kwok
Jet Propulsion Laboratory
California Institute of Technology

Over 2500 minutes of synthetic aperture radar (SAR) data suitable for interferometric analysis were collected over Antarctica during the ERS tandem mission in late 1995 and early 1996. We have processed a large subset of this ERS tandem dataset recorded at the US McMurdo Reception Facility (and archived at the Alaska SAR Facility) to produce estimates of ice motion. Spatial coverage includes a large part of West Antarctica between the Antarctic Peninsula and the eastern Ross Ice Shelf, and the part of East Antarctica between the western Ross Ice Shelf and the Amery Ice Shelf north of 80S. Velocity maps are created by blending interferometric observations with available temporal baselines of 1-, 35-, 36-, 70-, and 71-days. The longer baselines provide estimates of velocity with accuracy of better than 1 m/yr and thus give a first glimpse of the velocity field at higher elevations. The blending methodology, the control of the velocity field, the assessment of the data quality, and the spatially dependent error field are discussed. Preliminary large scale comparisons of our results with lower resolution balance velocity fields show interesting differences between the patterns and the magnitude of motion fields. Anomalies in the observed velocity field are highlighted.